SECTION 22 05 33

HEAT TRACING FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

Heat tracing for plumbing piping.

1.2 RELATED WORK

A. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

B. Pipe Insulation: Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data: Hot water temperature maintenance heat tracing.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Federal Specifications (Fed. Spec.):

L-T-1512A.....Tape, Pressure Sensitive Adhesive, Pipe Wrapping

C. National Association of Plumbing - Heating - Cooling Contractors (PHCC):

National Standard Plumbing Code - 1996

PART 2 - PRODUCTS

2.1 HOT WATER TEMPERATURE MAINTENANCE HEAT TRACING

Electric heat tracing, automatic self-regulating type, UL listed, tinned copper braid shield, able to crossover itself without overheating, parallel circuit design able to be cut to any length at job site and shall be corrosive and chemical resistant. Heat tracing shall protect pipes from freezing. Heat tracing shall be complete with power connection kits, splice kits, tee kits, end seal kits and accessories required for a complete operable system. Provide with heat tracing control panel and integrated with Building Automation System. Coordinate location of control panel with Electrical Contractor and Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

General: Comply with the PHCC National Standard Plumbing Code.

3.2 TESTS

A. Heat Tracing Systems Testing: Continuity test heat tracing systems and test insulation resistance. Continuity test each cable by applying 12 or 24 VCD to bus wires at the power connection kit and checking voltage drop at the ends of each branch of the circuit. Voltage drop shall not be less than 75 % of the applied voltage. For insulation resistance test (Megger Test) of each cable, use a megometer. Megger Test at 2500 VDC each cable system two times. Perform first Megger Test after cable is installed, but prior to the installation of insulation. Minimum Megger readings shall be 20 megohms, regardless of heater length. If Megger reading is less than 20 megohms, locate the fault and correct or replace cable. Manufacturer’s representative of the tracing shall supervise tests. Submit “test Certificates of Approval” for all tests, including test values of each circuit, signature of manufacturer’s representative, and manufacturer's representative’s approval of test results.

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SECTION 22 33 00

ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION

Domestic electric water heater system complete, ready for operation including water heaters, thermometers and all necessary accessories, connections and equipment.

1.2 RELATED WORK

A. Preparation and finish painting Section 09 91 00, PAINTING.
B. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
C. Circulating Pump: Section 22 11 23, DOMESTIC WATER PUMPS.
D. Heater Insulation: Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.
E. Piping, Fittings, Valves and Gages: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING, and 22 11 00, FACILITY WATER DISTRIBUTION.

1.3 QUALITY ASSURANCE

A. Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) for efficiency performance:
   1. ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings ”for commercial water heaters.”

1.4 SUBMITTALS

A. Submit manufacturer’s literature and data pertaining to the water heater in properly bound package, in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Include the following as a minimum:
   1. Water Heaters.
   2. Pressure and Temperature Relief Valves.
   4. Thermometers.
   5. Pressure Gages.
   6. Vacuum Breakers.

1.5.APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
B. American National Standard Institute (ANSI):
   Z21.22-00/4.4A-00.....Relief Valves for Hot Water Supply systems
C. American Society Of Mechanical Engineers (ASME):
   B1.20.1-83(R 1992)......Pipe Threads, General Purpose (Inch)
   B16.5-03.....Pipe Flanges and Flanged Fittings

B16.24-01.....Cast Copper Alloy Pipe Flanges
PTC 25.3-02.....Pressure Relief Devices
Section IV-04.....Heating Boilers
Section VIII-04.....Pressure Vessels Division 1

D. National Fire Protection Association (NFPA)
70-02.....National Electrical Code

E. Underwriters Laboratories, Inc. (UL):
174-04.....Household Electric Storage Tank Water Heaters
1453-95(Amendment 1/ 1998) Water Heaters, Electric Booster and Commercial Storage Tank

PART 2 - PRODUCTS

2.1 ELECTRIC WATER HEATERS (EWH-1 BASIS OF DESIGN)

A. Tank Construction: Steel shell, glass lined, and ASME-Code construction with 1035 kPa (150 psig) working pressure rating.

B. Tapping (openings): Factory fabricated of materials compatible with the tank and in accordance with appropriate ASME standards for piping connection, pressure and temperature relief valve, pressure gauge, thermometer, drain valve, anode rods and controls as required.

C. Insulation: Comply with ASHRAE 90.1.
1. 50-mm (2 inch) and smaller: Threaded ends according to ASME B1.20.1.
2. 65-mm (2 1/2-inch) and Larger: Flanged ends according to ASME B16.5 for steel and stainless steel flanges, and according to ASME B 16.24.

D. Heating Element: Double element, immersion type, thermostatically adjustable. Set thermostat for maximum water temperature of 55 degrees C (130 degrees F). Phase and voltage as shown on the drawings.

E. Combination Pressure and Temperature Relief Valves: ASME rated, constructed of all brass or bronze with a self-closing reseating valve. Pressure setting shall be less than water heater working pressure, and relieving capacity shall not be less than heat input.

F. Provide monitoring with The Building Automation System to include water temperature if over 130°F or below 110°F, system status on/off/disable.

2.2 THERMOMETERS

Electric Water Heaters: Straight stem, iron case, red reflecting mercury thermometer or red liquid-filled thermometers, approximately 175 mm (7 inches) high, 4 to 115 degrees C (40 to 240 degrees F). Install in hot water pipe close to outlet of tank.

2.3 TANKLESS ELECTRIC WATER HEATER (EWH-2 BASIS OF DESIGN)

A. The point of use water heater shall be a Chronomite Laboratories Instant-Temp Microprocessor Temperature Controlled Electric Tankless

Water Heater, Model No. E-60 with 277 vac and 22 amperage, with Celcon waterways and stainless steel heating coils.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water heaters on concrete bases. Refer to Specification Section 03 30 00, CAST-IN-PLACE CONCRETE and Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING
B. Install water heaters level and plumb.
C. Install and connect water heaters in accordance with manufacturer’s written instructions.
D. Pipe all pressure and temperature relief valves discharge to nearby floor drains.
E. Install thermometers on water heater inlet and outlet piping.
F. Set the thermostats for a maximum setting of 54 degrees C (130 degrees F).

3.2 LEAKAGE TEST

Before piping connections are made, test water heaters with hydrostatic pressure of 1375 kPa (200 psi and 240 psi for a unit with a MAWP of 160 psi. Correct any leakage or replace water heater and retest at no additional cost to the VA.

3.3 PERFORMANCE TEST

Ensure that all of the remote water outlets will have a minimum of 49 degrees C (120 degrees F) and a maximum of 54 degrees C (130 degrees F) water flow at all times. If necessary, make all correction to balance the return water system or reset the thermostat to make the system comply with design requirements.

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SECTION 22 11 00

FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION

Domestic water systems, including piping, equipment and all necessary accessories as designated in this section.

1.2 RELATED WORK

A. Penetrations in rated enclosures: Section 07 84 00, FIRESTOPPING.

B. Preparation and finish painting and identification of piping systems: Section 09 91 00, PAINTING.

C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

D. Pipe Insulation: Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Piping.
2. Strainers.
3. All items listed in Part 2 - Products.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Federal Specifications (Fed. Spec.):

A-A-1427C.....Sodium Hypochlorite Solution
A-A-59617.....Unions, Brass or Bronze Threaded, Pipe Connections and Solder-Joint Tube Connections

C. American National Standards Institute (ANSI):

American Society of Mechanical Engineers (ASME): (Copyrighted Society)
A13.1-96.....Scheme for Identification of Piping Systems
B16.3-98.....Malleable Iron Threaded Fittings ANSI/ASME
B16.4-98.....Cast Iron Threaded Fittings Classes 125 and 250 ANSI/ASME
B16.9-01.....Factory-Made Wrought Steel Buttwelding Fittings ANSI/ASME

B16.11-01.....Forged Steel Fittings, Socket-Welding and Threaded ANSI/ASME
B16.12-98.....Cast Iron Threaded Drainage Fittings ANSI/ASME
B16.15-85(R 1994).....Cast Bronze Threaded Fittings ANSI/ASME
B16.18-01.....Cast Copper Alloy Solder-Joint Pressure Fittings ANSI/ASME
B16.22-01.....Wrought Copper and Copper Alloy Solder Joint Pressure Fittings ANSI/ASME Element ANSI/ASME

D. American Society for Testing and Materials (ASTM):

A47-99.....Ferritic Malleable Iron Castings Revision 1989
A53-02.....Pipe, Steel, Black And Hot-Dipped, Zinc-coated Welded and Seamless
A74-03.....Cast Iron Soil Pipe and Fittings
A183-83(R1998).....Carbon Steel Track Bolts and Nuts
A312-03.....Seamless and Welded Austenitic Stainless Steel Pipe
A536-84(R1999) E1.....Ductile Iron Castings
A733-03.....Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
B32-03.....Solder Metal
B61-02.....Steam or Bronze Castings
B62-02.....Composition Bronze or Ounce Metal Castings
B75-99(Rev A).....Seamless Copper Tube
B88-03.....Seamless Copper Water Tube
B584-00.....Copper Alloy Sand Castings for General Applications Revision A
B687-99.....Brass, Copper, and Chromium-Plated Pipe Nipples
C564-03.....Rubber Gaskets for Cast Iron Soil Pipe and Fittings
D2000-01.....Rubber Products in Automotive Applications
D4101-03b Propylene Plastic Injection and Extrusion Materials
D2447-93.....Polyethylene (PE) Plastic Pipe, Schedule 40 and 80, Based on Outside Diameter
D2564-94.....Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D2665-94 Revision A.....Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
D4101-03b.....Propylene Plastic Injection and Extrusion Materials
E1120.....Standard Specification For Liquid Chlorine
E1229.....Standard Specification For Calcium Hypochlorite

E. American Water Works Association (AWWA):
C110-03/ A21.10-03.....Ductile Iron and Gray Iron Fittings - 75 mm thru 1200 mm (3 inch thru 48 inches) for Water and other liquids AWWA/ ANSI
C151-00/ A21.51-02.....Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids AWWA/ ANSI
C203-02.....Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied AWWA/ ANSI
C651-99.....Disinfecting Water Mains

F. American Welding Society (AWS):
A5.8-92.....Filler Metals for Brazing

G. National Association of Plumbing - Heating - Cooling Contractors (PHCC):
National Standard Plumbing Code - 1996

H. International Association of Plumbing and Mechanical Officials (IAPMO):
Uniform Plumbing Code - 2000
IS6-93.....Installation Standard

I. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
SP-72-99.....Ball Valves With Flanged or Butt Welding For General Purpose
SP-110-96.....Ball Valve Threaded, Socket Welding, Solder Joint, Grooved and Flared Ends

J. American Society of Sanitary Engineers (ASSE):
1001-02.....Pipe Applied Atmospheric Type Vacuum Breakers
1018-01.....Performance for trap seal primer valve-water supply fed
1020-04.....Vacuum Breakers, Anti-Siphon, Pressure Type

K. Plumbing and Drainage Institute (PDI):
PDI WH-201.....Water Hammer Arrestor

PART 2 - PRODUCTS

2.1 WATER SERVICE CONNECTIONS TO BUILDINGS

A. From inside face of exterior wall to a distance of approximately 1500 mm (5 feet) outside of building and underground inside building, material selected shall be the same for the size specified.

B. Seventy five millimeters (3 inch) Diameter and Over: Ductile iron, AWWA C151, 850 kPa (125 pounds) water steam pressure (WSP), exterior bituminous coating, cement lined. Provide flanged and anchored connection to interior piping.

C. Under 75 mm (3 inch) Diameter: Copper tubing, ASTM B88, Type K, seamless, annealed. Fittings as specified under Article, INTERIOR DOMESTIC WATER PIPING. Use brazing alloys, AWS A5.8, Classification BCuP.

D. Flexible Expansion Joint: Ductile iron with ball joints rated for 1725 kPa (250 psi) working pressure conforming to ANSI/AWWA A21.53/C153, capable of deflecting a minimum of 30 degrees and expanding simultaneously to the amount shown on the drawings. Flexible expansion joint shall have the expansion capability designed as an integral part of the ductile iron ball castings. Pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be factory holiday tested with a 1500 volt spark test. Flexible expansion joint shall have flanged connections conforming to ANSI/AWWA A21.11/C110. Bolts and nuts shall be 316 stainless steel and gaskets shall be neoprene.

2.2 INTERIOR DOMESTIC WATER PIPING

A. Pipe: Copper tube, ASTM B88, Type K or L, drawn. For pipe 150 mm (6 inches) and larger, stainless, steel ASTM A312, schedule 10 may be used.

B. Fittings for Copper Tube:

1. Wrought copper or bronze castings conforming to ANSI B16.18 and B16.22. Unions shall be bronze, MSS SP72 & SP 110, Solder or braze joints.
2. Grooved fittings, 50 to 150 mm (2 to 6 inch) wrought copper ASTM B75 C12200, 125 to 150 mm (5 to 6 inch) bronze casting ASTM B584, CDA 844. Mechanical grooved couplings, ductile iron, ASTM A536 (Grade 65-45-12), or malleable iron, ASTM A47 (Grade 32510) housing, with

EPDM gasket, steel track head bolts, ASTM A183, coated with copper colored alkyd enamel.

3. Mechanically formed tee connection: Form mechanically extracted collars in a continuous operation by drilling pilot hole and drawing out tube surface to form collar, having a height of not less than three times the thickness of tube wall. Adjustable collaring device shall insure proper tolerance and complete uniformity of the joint. Notch and dimple joining branch tube in a single process to provide free flow where the branch tube penetrates the fitting. Braze joints.

C. Fittings for Stainless Steel:
   1. Stainless steel butt-welded fittings, Type 316, Schedule 10, conforming to ANSI B16.9.
   2. Grooved fittings, stainless steel, Type 316, Schedule 10, conforming to ASTM A403. Segmentally fabricated fittings are not allowed. Mechanical grooved couplings, ductile iron, ASTM A536 (Grade 65-45-12), or Malleable iron, ASTM A47 (Grade 32510) housing, with EPDM gasket, steel track head bolts, ASTM A183, coated with copper colored alkyd enamel.

D. Adapters: Provide adapters for joining screwed pipe to copper tubing.

E. Solder: ASTM B32 Composition Sb5 HA or HB. Provide non-corrosive flux.

F. Brazing alloy: AWS A5.8, Classification BCuP.

2.3 EXPOSED WATER PIPING

A. Finished Room: Use full iron pipe size chrome plated brass piping for exposed water piping connecting fixtures, casework, cabinets, equipment and reagent racks when not concealed by apron including those furnished by the Government or specified in other sections.
   1. Pipe: Fed. Spec. WW-P-351, standard weight.
   2. Fittings: ANSI B16.15 cast bronze threaded fittings with chrome finish, (125 and 250).
   3. Nipples: ASTM B 687, Chromium-plated.
   4. Unions: Mss SP-72, SP-110, Brass or Bronze with chrome finish. Unions 65 mm (2-1/2 inches) and larger shall be flange type with approved gaskets.

B. Unfinished Rooms, Mechanical Rooms and Kitchens: Chrome-plated brass piping is not required. Paint piping systems as specified in Section 09 91 00, PAINTING.

2.4 ETO WATER PIPING

Stainless steel, ASTM A312, Schedule 10 with stainless steel butt welded fittings.

2.5 TRAP PRIMER WATER PIPING:

A. Pipe: Copper tube, ASTM B88, type K, hard drawn.

B. Fittings: Bronze castings conforming to ANSI B16.18 Solder joints.

C. Solder: ASTM B32 composition Sb5. Provide non-corrosive flux.

2.6 WATERPROOFING

A. Provide at points where pipes pass through membrane waterproofed floors or walls in contact with earth.

B. Floors: Provide cast iron stack sleeve with flashing device and a underdeck clamp. After stack is passed through sleeve, provide a waterproofed caulked joint at top hub.

C. Walls: See detail shown on drawings.

2.7 STRAINERS

A. Provide on high pressure side of pressure reducing valves, on suction side of pumps, on inlet side of indicating and control instruments and equipment subject to sediment damage and where shown on drawings. Strainer element shall be removable without disconnection of piping.

B. Water: Basket or "Y" type with easily removable cover and brass strainer basket.

C. Body: Smaller than 80 mm (3 inches), brass or bronze; 80 mm (3 inches) and larger, cast iron or semi-steel.

2.8 DIELECTRIC FITTINGS

Provide dielectric couplings or unions between ferrous and non-ferrous pipe.

2.9 STERILIZATION CHEMICALS

A. Liquid Chlorine: ASTM E1120.

B. Hypochlorite: ASTM E1229, or Fed. Spec. AA-1427C, grade B.

2.10 WATER HAMMER ARRESTER:

Closed copper tube chamber with permanently sealed 410 kPa (60 psig) air charge above a Double O-ring piston. Two high heat Buna-N 0-rings pressure packed and lubricated with FDA approved Dow Corning No. 11 silicone compound. All units shall be designed in accordance with ASSE 1010 for sealed wall installations without an access panel. Size and install in accordance with Plumbing and Drainage Institute requirements (PDI WH 201). Unit shall be as manufactured by Precision Plumbing Products Inc., Watts or Sioux Chief. Provide water hammer arrestors at

all solenoid valves, at all groups of two or more flush valves, at all quick opening or closing valves, and at all medical washing equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with the PHCC National Standard Plumbing Code and the following:

1. Install branch piping for water from the piping system and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other sections.
2. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe, except for plastic and glass, shall be reamed to full size after cutting.
3. All pipe runs shall be laid out to avoid interference with other work.
4. Install union and shut-off valve on pressure piping at connections to equipment.
5. Pipe Hangers, Supports and Accessories:
   a. All piping shall be supported per of the National Standard Plumbing Code, Chapter No. 8.
   b. Shop Painting and Plating: Hangers, supports, rods, inserts and accessories used for Pipe supports shall be shop coated with red lead or zinc Chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper tubing.
   c. Floor, Wall and Ceiling Plates, Supports, Hangers:
      1) Solid or split unplated cast iron.
      2) All plates shall be provided with set screws.
      3) Pipe Hangers: Height adjustable clevis type.
      4) Adjustable Floor Rests and Base Flanges: Steel.
      5) Concrete Inserts: "Universal" or continuous slotted type.
      6) Hanger Rods: Mild, low carbon steel, fully threaded or Threaded at each end with two removable nuts at each end for positioning rod and hanger and locking each in place.
      7) Riser Clamps: Malleable iron or steel.
      8) Rollers: Cast iron.
      9) Self-drilling type expansion shields shall be "Phillips" type, with case hardened steel expander plugs.

10)Hangers and supports utilized with insulated pipe and tubing shall have 180 degree (min.) metal protection shield Centered on and welded to the hanger and support. The shield shall be 4 inches in length and be 16 gauge steel. The shield shall be sized for the insulation.

11)Miscellaneous Materials: As specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories. If the vertical distance exceeds 6 m (20 feet) for cast iron pipe additional support shall be provided in the center of that span. Provide all necessary auxiliary steel to provide that support.

6. Install cast escutcheon with set screw at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
7. Penetrations:
   a. Fire Stopping: Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between raceways and openings with the fire stopping materials.
   b. Waterproofing: At floor penetrations, completely seal clearances around the pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS.

B. Piping shall conform to the following:
1. Domestic Water:
   a. Where possible, grade all lines to facilitate drainage. Provide drain valves at bottom of risers. All unnecessary traps in circulating lines shall be avoided.
   b. Connect branch lines at bottom of main serving fixtures below and pitch down so that main may be drained through fixture. Connect branch lines to top of main serving only fixtures located on floor above.

3.2 TESTS

A. General: Test system either in its entirety or in sections.
B. Potable Water System: Test after installation of piping and domestic water heaters, but before piping is concealed, before covering is applied, and before plumbing fixtures are connected. Fill systems with

water and maintain hydrostatic pressure of 690 kPa (100 psi) gage for two hours. No decrease in pressure is allowed. Provide a pressure gage with a shutoff and bleeder valve at the highest point of the piping being tested.

C. Reagent Grade Water Systems: Fill system with water and maintain hydrostatic pressure of 690 kPa (100 psi) gage during inspection and prove tight.

D. All Other Piping Tests: Test new installed piping under 1 1/2 times actual operating conditions and prove tight.

3.3 STERILIZATION

A. After tests have been successfully completed, thoroughly flush and sterilize the interior domestic water distribution system in accordance with AWWA C651.

B. Use either liquid chlorine or hypochlorite for sterilization.

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SECTION 22 40 00

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

Plumbing fixtures, associated trim and fittings necessary to make a complete installation from wall or floor connections to rough piping, and certain accessories.

1.2 RELATED WORK

A. Sealing between fixtures and other finish surfaces: Section 07 92 00, JOINT SEALANTS.

B. Flush panel access doors: Section 08 31 13, ACCESS DOORS AND FRAMES.

C. Through bolts: Section 10 21 13, TOILET COMPARTMENTS.

D. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submit plumbing fixture information in an assembled brochure, showing cuts and full detailed description of each fixture.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standard Institute (ANSI):
The American Society of Mechanical Engineers (ASME):
A112.6.1M-02(R2008).....Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use
A112.19.1M-04.....Enameled Cast Iron Plumbing fixtures
A112.19.2M-03(R2008)....Vitreous China Plumbing Fixtures
A112.19.3-2001(R2008)...Stainless Steel Plumbing fixtures (Designed for Residential Use)

C. American Society for Testing and Materials (ASTM):
A276-2003.....Stainless and Heat-Resisting Steel Bars and Shapes

D. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM AMP 500-505
Metal Finishes Manual (1988)

E. American Society of Sanitary Engineers (ASSE):
1016-05.....Performance Requirements for Individual Thermostatic, Pressure Balancing and Combination

Pressure Balancing and Thermostatic Control Valves for Individual Fixture Fittings

F. National Sanitation Foundation (NSF)/American National Standards Institute (ANSI):
61-03.....Drinking Water System Components-Health Effects

G. American with Disabilities Act(A.D.A) Section 4-19.4 Exposed Pipes and Surfaces

PART 2 - PRODUCTS

2.1 STAINLESS STEEL

A. Corrosion-resistant Steel (CRS):
1. Plate, Sheet and Strip: CRS flat products shall conform to chemical composition requirements of any 300 series steel specified in ASTM A276.
2. Finish: Exposed surfaces shall have standard polish (ground and polished) equal to NAAMM finish Number 4.

B. Die-cast zinc alloy products are prohibited.

2.2 STOPS

A. Provide lock-shield loose key or screw driver pattern angle stops, straight stops or stops integral with faucet, with each compression type faucet whether specifically called for or not, including sinks in wood and metal casework, laboratory furniture and pharmacy furniture. Locate stops centrally above or below fixture in accessible location.

B. Furnish keys for lock shield stops to Resident Engineer.

C. Supply from stops not integral with faucet shall be chrome plated copper flexible tubing or flexible stainless steel with inner core of non-toxic polymer.

D. Supply pipe from wall to valve stop shall be rigid threaded IPS copper alloy pipe, i.e. red brass pipe nipple.

E. Psychiatric Area: Provide stainless steel drain guard for all lavatories not installed in casework.

2.3 ESCUTCHEONS

Heavy type, chrome plated, with set screws. Provide for piping serving plumbing fixtures and at each wall, ceiling and floor penetrations in exposed finished locations and within cabinets and millwork.

2.4 LAMINAR FLOW CONTROL DEVICE

A. Smooth, bright stainless steel or satin finish, chrome plated metal laminar flow device shall provide non-aeration, clear, coherent laminar flow that will not splash in basin. Device shall also have a flow control restrictor and have vandal resistant housing.

B. Flow Control Restrictor:

1. Capable of restricting flow from 95 to 110 mL/s (1.5 to 1.7 gpm) for lavatories; 125 to 140 mL/s (2.0 to 2.2 gpm) for sinks P-505 through P-520, P-524 and P-528; and 170 to 190 mL/s (2.75 to 3.0 gpm) for dietary food preparation and rinse sinks.
2. Compensates for pressure fluctuation maintaining flow rate specified above within 10 percent between 170 and 550 kPa (25 and 80 psi).
3. Operates by expansion and contraction, eliminates mineral/sediment build-up with self-clearing action, and is capable of easy manual cleaning.

C. Device manufactured by OMNI Products, Inc. or equal.

2.5 CARRIERS

A. ASME/ANSI A112.6.1M, with adjustable gasket faceplate chair carriers for wall hung closets with auxiliary anchor foot assembly, hanger rod support feet, and rear anchor tie down.

B. ASME/ANSI A112.6.1M, lavatory. All lavatory chair carriers shall be capable of supporting the lavatory with a 250-pound vertical load applied at the front of the fixture.

C. Where water closets, lavatories or sinks are installed back-to-back and carriers are specified, provide one carrier to serve both fixtures in lieu of individual carriers. The drainage fitting of the back to back carrier shall be so constructed that it prevents the discharge from one fixture from flowing into the opposite fixture.

2.6 WATER CLOSETS (BASIS OF DESIGN)

A. (P-101) Water Closet (Floor Mounted, ANSI 112.19.2M, Figure 6) – office and industrial, elongated bowl, siphon jet 6 L (1.6 gallons) per flush, floor outlet. Top of rim shall be 460 mm (18 inches) above finished floor. Kohler Model K-4368.

1. Seat: Institutional/Industrial, extra heavy duty, chemical resistant, solid plastic, open front less cover for elongated bowls, integrally molded bumpers, concealed check hinge with stainless steel post. Seat shall be posture contoured body design. Color shall be white, Beneke Model 527SS.
2. Fittings and Accessories: Floor flange fittings-cast iron; Gasket-wax; bolts with chromium plated cap nuts and washers.
3. Flush Valve: Large diaphragm, semi red brass valve body, exposed chrome plated, non-hold-open ADA approved side oscillating handle water saver design 6 L (1.6 gallons) per flush with maximum 10 percent variance, top spud connection, adjustable tailpiece, one inch IPS screwdriver back check angle stop with vandal resistant cap, high back pressure vacuum breaker, and sweat solder adapter with cover

tube and cast set screw wall flange. Set centerline of inlet 275 mm (11-1/20 inches above rim. Seat bumpers shall be integral part of flush valve. Valve body, cover, tailpiece and control stop shall be in conformance with ASTM Alloy classification for semi-red brass. Sloan Royal Model 111-YO.

2.7 WATER CLOSETS (BASIS OF DESIGN)

A. (P-103) Water Closet (Wall Hung, ASME/ANSI A112.19.2M, Figure 9) office and industrial, elongated bowl, siphon jet 6 L (1.6 gallons) per flush, wall outlet. Top of rim shall be between 410 and 435 mm (16 to 17 inches) above finished floor. Handicapped water closet shall have rim set 460 mm (18 inches) above finished floor. Kohler Model K-4330.

1. Seat: Institutional/Industrial, extra heavy duty, chemical resistant, solid plastic, open front less cover for elongated bowls, integrally molded bumpers, concealed check hinge with stainless steel post. Seat shall be posture contoured body design. Color shall be white. Beneke Model 533SS.
2. Fittings and Accessories: Gaskets - neoprene; bolts with chromium plated caps nuts and washers.
3. Flush valve: Large chloramines resistant diaphragm, semi-red brass valve body, exposed chrome plated, non-hold open ADA approved side oscillating handle, water saver design 6 L (1.6 gallons) pushing handle down, 4.2L (1.1 gallons) lifting handle up per flush with maximum 10 percent variance 25mm (one-inch) screwdriver back check angle stop with vandal resistant cap, adjustable tailpiece, a high back pressure vacuum breaker, spud coupling for 40 mm (1-1/2 inch) top spud, wall and spud flanges, and sweat solder adapter with cover tube and set screw wall flange. Valve body, cover, tailpiece and control stop shall be in conformance with ASTM alloy classification for semi-red brass. Seat bumpers shall be integral part of flush valve. Set centerline of inlet 292 mm (11-1/2 inches) above rim. Sloan Model WES-111 YO-Uppercut.

2.8 URINALS (BASIS OF DESIGN)

A. (P-201) Urinal (Wall Hung, ANSI A112.19.2M, Figure 30) bowl with integral flush distribution, wall to front of flare 356 mm (14 inches). Wall hung with integral trap, siphon jet flushing action 2 L (0.5 gallons) per flush with 50mm (2-inch) back outlet and 20 mm (3/4-inch) top inlet spud. Kohler Model K-4960-ET.

1. Support urinal with chair carrier and install with rim 600 mm (24 inches) above finished floor.

2. Flushing Device: Large chloramines resistant diaphragm, semi-red brass body, exposed flush valve 0.5 gpf non-hold-open, water saver design, 20 mm (3/4-inch) capped screwdriver angle stop valve. Set centerline of inlet 292 mm (11-1/2 inches) above urinal. Valve body, cover, tailpiece, and control stop shall be in conformance with ASTM alloy classification for semi-red brass. Sloan Model 186-0.5.

B. (P-202) Urinal (Wheelchair, Wall Hung, ANSI A112.19.2M, Figure 30) bowl with integral flush distribution, wall to front of flare 356mm (14 inches). Wall hung with integral trap, siphon jet flushing action 2 L (0.5 gallons) per flush) with 50mm (2-inch) back outlet and 20 mm (3/4 inch) top inlet spud.

1. Support urinal with chair carrier and install with rim 380 mm (15 inches) above finished floor.
2. Flushing Device: Large chloramines resistant diaphragm, semi- red brass body, exposed flush valve, 0.5 gpf non-hold-open, water saver design, 20 mm (3/4-inch) capped screwdriver angle stop valve. Set centerline of inlet 292 mm (11-1/2 inches) above urinal. Valve body, cover, tailpiece and control stop shall be in conformance with ASTM alloy classification for semi-red brass. Sloan Model 186-0.5.

2.9 LAVATORIES (BASIS OF DESIGN)

A. Dimensions for lavatories are specified, Length by width (distance from wall) and depth.

B. Brass components in contact with water shall contain no more than 3 percent lead content by dry weight.

C. (P-403) Lavatory (Wrist Blade and Foot Pedal Control, ASME/ANSI A112.19.2M, Figure 16) straight back, approximately 20 x 18 inches and a 4-inch maximum apron, first quality vitreous china. Centrally located three hole in slab for rigid gooseneck spout. Escutcheons shall be either copper alloy or CRS. Provide valve plate for foot control. Set with rim (34 inches) above finished floor. Kohler Model K-2006.

1. Faucets: Solid cast brass construction, single rigid gooseneck spout 4″ wrist blade handles plain end outlet with third water connection for hot and cold water foot pedal controls Model 786TWGN2A-FC manufactured by Chicago Faucet. Provide laminar 1.6 gpm flow control device. Wall mounted, mechanical pedal mixing valve with self-closing pedal valve with stops, renewable seats, and supply from valve to spout, indexed lift up pedals having clearances of not more than 1/2-inch above the floor and not less than 14 inches from wall when in operation. Supply pipe from wall to valve stop shall be rigid threaded IPS copper allow pipe. Supply pipe from valve to faucet

shall be manufacturer's option. Exposed brass parts shall be chrome plated with a smooth bright finish, Model 834-EPSL0 manufactured by Chicago Faucet.

2. Drain: Cast or wrought brass with flat grid strainer and tail piece, chrome plated finish.
3. Trap: Cast copper allow, 1-1/2 x 1-1/4 inch P-trap. Adjustable with connected elbow and 1.4 mm thick (17 gauge) tubing extension nipple to wall. Exposed metal trap surface and connection hardware shall be chrome plate with a smooth bright finish.
4. Provide cover for drain, stops and trap per ADA 4-19.4.

D. (P-414) Lavatory (Lever Control, ASME/ANSI A112.19.2M, Figure 16) straight back, approximately 500 by 450 mm (20 by 18 inches) and a 102 mm (4-inch) minimum apron, first quality vitreous china. Punching for faucet shall be on 203 mm (4-inch) centers. Set rim 864 mm (34 inches) above finished floor. Kohler Model K-2005.
   1. Faucet: Solid cast brass construction with washerless ceramic mixing cartridge type and centrally exposed integral spout with outlet 102 to 127 mm (4 to 5 inches) above rim. Provide laminar flow control device. One hundred two millimeter (4-inch) lever blade type, handles on faucets shall be cast, formed or drop forged copper alloy. Faucet, wall and floor escutcheons shall be either copper alloy or CRS. Exposed metal parts, including exposed part under valve handle when in open position, shall be chrome plated with a smooth bright finish. Chicago Faucet Model 802-CP with OMNI L-200 0.5 gpm fitting.
   2. Drain: Cast or wrought brass with flat grid strainer, offset tailpiece, chrome plated.
   3. Stops: Angle type. See paragraph 2.2.Stops
   4. Trap: Cast copper alloy, 40 by 32 mm (1-1/2 by 1-1/4 inch) P-trap. Adjustable with connected elbow and 1.4 mm thick (17 gauge) tubing extension to wall. Exposed metal trap surface, and connection hardware shall be chrome plated with a smooth bright finish. Set trap parallel to the wall.
   5. Provide cover for drain, stops and trap per A.D.A 4-19.4.

E. (P-421) Lavatory ASME/ANSI A112.19.2M, Fig 25)
   1. Basin: ANSI A112.19.1; vitreous china under counter lavatory 19" x 15" minimum, rear overflow; Model K-2211 manufactured by Kohler.
   2. Faucet: Solid cast brass construction with washerless ceramic mixing cartridge type and centrally exposed integral spout with outlet 102 to 127 mm (4 to 5 inches) above rim. Provide laminar flow control device. One hundred two millimeter (4-inch) lever blade type, handles

on faucets shall be cast, formed or drop forged copper alloy. Faucet, wall and floor escutcheons shall be either copper alloy or CRS. Exposed metal parts, including exposed part under valve handle when in open position, shall be chrome plated with a smooth bright finish. Chicago Faucet Model 802-CP with OMNI L-200 0.5 gpm fitting.

3. Accessories: ASME A112.18.1M; chrome plated cast brass P-trap with cleanout; Model 8902 manufactured by McGuire Manufacturing Company, Inc., flexible supply kit shall include heavy chrome plated brass stops with full turn brass stem (no plastic), 12 inch chrome plated risers, cast brass nipples, inlet and outlet shall be 3/8″ IPS, Model H167LK manufactured by McGuire Manufacturing Company, Inc. Wrap trap for handicapped accessibility.

2.10 SINKS AND LAUNDRY TUBS (BASIS OF DESIGN)

A. Dimensions for sinks and laundry tubs are specified, length by width (distance from wall) and depth.

B. (P-502) Service Sink (Floor Mounted) stain resistant terrazzo, 914 by 609 mm (36 by 24 by 12 inches) with 152 mm (six-inch) drop front. Terrazzo, composed of marble chips and white Portland cement, shall develop compressive strength of 20 684 kPa (3000 psi) seven days after casting. Provide extruded aluminum cap on front side. Stern Williams Model HL-2110.

1. Faucet: Solid brass construction, combination faucet with replaceable monel seat, removable replacement unit containing all parts subject to wear, integral stops, mounted on wall above sink. Spout shall have a pail hook, 20 mm (3/4-inch) hose coupling threads, vacuum breaker, and top or bottom brace to wall. Four-arm handles on faucets shall be cast, formed, or drop forged copper alloy. Escutcheons shall be either forged copper alloy or CRS. Exposed metal parts, including exposed part under valve handle when in open position, shall have a smooth bright finish. Provide 914 mm (three-foot) hose with wall hook. Centerline of rough in is 1220 mm (48 inches) above finished floor. Chicago Faucet Model 897-CP.
2. Drain: Eighty millimeter (3-inch) cast brass drain with nickel bronze strainer.
3. Trap: P-trap, drain through floor.

C. (P-517) Sink (CRS, Single Compartment, Counter Top ASME/ANSI A112.19.2M, Exam Sinks, Figure 5).

1. Bowl: ANSI A112.19.3; single compartment, 19 x 18 x 7-5/8 inch outside dimensions, 18 gauge, Type 304 stainless steel, self rimming with undercoating, stainless steel 3-1/2 inch perforated grid

strainer and drain, ledge back drilled for trim, Model LRQ1918 manufactured by Elkay Manufacturing Company.

2. Trim: ASME A112.18.1; chrome plated combination gooseneck fitting with 4-inch wrist blade handles and integral flow control 1.6 gpm plain end outlet with third water connection for hot and cold water foot pedal controls. Model 786-TWGN2A-FC manufactured by Chicago Faucets. Provide polished chrome plated, solid brass short metal pedals with slow closing adjustable metering cartridge foot pedals Model 625-SLOCP manufactured by Chicago Faucets. Cast brass chrome plated grid drain less overflow with 1-1/4" x 6" seamless brass tailpiece, brass locknut, heavy rubber basin washer and fiber friction washer. Model "ProDrain" manufactured by McGuire Manufacturing Company, Inc.
3. Accessories: ASME A112.18.1M; chrome plated cast brass P-trap with cleanout; Model 8902 manufactured by McGuire Manufacturing Company, Inc., flexible supply kit shall include heavy chrome plated brass tops with full turn brass stem (no plastic), 12 inch chrome plated risers, cast brass nipples, inlet and outlet shall be 3/8" IPS, Model H167LK manufactured by McGuire Manufacturing Compan8u, Inc.

D. (P-518) – Sink (CRS, Single Compartment, Counter Top ASME/ANSI A112.19.2M, Kitchen Sinks, Figure 5)

1. Bowl: ANSI A112.19.3, single compartment, 19 x 18 x 7-5/8 inch outside dimensions, 18 gauge, Type 304 stainless steel, self rimming with undercoating, stainless steel 3-1/2 inch perforated grid strainer and drain, ledge back drilled for trim, Model LRQ1918 manufactured by Elkay Manufacturing Company
2. Trim: ASME A112.18.1; chrome plated combination gooseneck fitting with 4-inch wrist blade handles and integral flow control 1.6 gpm plain end outlet, Model 786-GN2-FC manufactured by Chicago Faucets. Cast brass chrome plated grid drain less overflow with 1-1/4" x 6" seamless brass tailpiece, brass locknut, heavy rubber basin washer and fiber friction washer. Model "ProDrain" manufactured by McGuire Manufacturing Company, Inc.
3. Accessories: ASME A112.18.1M; chrome plated cast brass P-trap with cleanout; Model 8902 manufactured by McGuire Manufacturing Company, Inc.; flexible supply kit shall include heavy pattern chrome plated brass tops with full turn brass stem, no plastic, 12 inch chrome plated risers, cast brass nipples inlet and outlets shall be 3/8" IPS, Model H167LK, manufactured by McGuire Manufacturing Company, Inc.

2.11 DISPENSER, DRINKING WATER (BASIS OF DESIGN)

A. Standard rating conditions: 10 degrees C (50 degrees F) water with 27 degrees C (80 degrees F) inlet water temperature and 32 degrees C (90 degrees F) ambient air temperature.

B. (P-609) Electric Water Cooler: Mechanically cooled, self contained, wheel chair, bubbler style fully exposed dual height stainless steel fountain, recessed in wall refrigeration system, stainless steel grille, stainless steel support arm, wall mounting box, energy efficient cooling system consisting of a hermetically sealed reciprocating type compressor, 115v, 60 Hz, single phase, fan cooled condenser, permanently lubricated fan motor. Set highest bubbler 1016mm (40 inches) above finished floor. Elkay Model EZTL8C stainless steel.

2.12 HYDRANT, HOSE BIBB AND MISCELLANEOUS DEVICES (BASIS OF DESIGN)

A. (P-801) Wall Hydrant: Cast bronze non-freeze hydrant with detachable T-handle. Brass operating rod within casing of bronze pipe of sufficient length to extend through wall and place valve inside building. Brass valve with coupling and union elbow having metal-to-metal seat. Valve rod and seat washer removable through face of hydrant; 20 mm (3/4-inch) hose thread on spout; 20 mm (3/4-inch) pipe thread on inlet. Finish may be rough; exposed surfaces shall be chrome plated. Set not less than 460 mm (1-1/2 feet) nor more than 920 mm (3-feet) above grade. On porches and platforms, set approximately 760 mm (2-1/2 feet) above finished floor. Provide integral vacuum breaker which automatically drains when shut off.

B. (P-804) Hose Bibb (Single Faucet, Wall Mounted to Exposed Supply Pipe): Cast or wrought copper alloy, single faucet with replaceable monel seat, removable replacement unit containing all parts subject to wear, mounted on wall 914 mm (36 inches) above floor to concealed supply pipe. Provide faucet with 20 mm (3/4-inch) hose coupling thread on spout and vacuum breaker. Four-arm handle on faucet shall be cast, formed or drop forged copper alloy. Escutcheons shall be either forged copper alloy or CRS. Exposed metal parts, including exposed part under valve handle when in open position, shall have a bright finish.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Fixture Setting: Opening between fixture and floor and wall finish shall be sealed as specified under Section 07 92 00, JOINT SEALANTS.

B. Supports and Fastening: Secure all fixtures, equipment and trimmings to partitions, walls and related finish surfaces. Exposed heads of bolts

and nuts in finished rooms shall be hexagonal, polished chrome plated brass with rounded tops.

C. Through Bolts: For free standing marble and metal stud partitions refer to Section 10 21 13, TOILET COMPARTMENTS.

D. Toggle Bolts: For hollow masonry units, finished or unfinished.

E. Expansion Bolts: For brick or concrete or other solid masonry. Shall be 6 mm (1/4-inch) diameter bolts, and to extend at least 75 mm (3-inches) into masonry and be fitted with loose tubing or sleeves extending into masonry. Wood plugs, fiber plugs, lead or other soft metal shields are prohibited.

F. Power Set Fasteners: May be used for concrete walls, shall be 6 mm (1/4-inch) threaded studs, and shall extend at least 35 mm (1-1/4 inches) into wall.

G. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury.

H. Where water closet waste pipe has to be offset due to beam interference, provide correct and additional piping necessary to eliminate relocation of water closet.

I. Do not use aerators on lavatories and sinks.

3.2 CLEANING

At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

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